Growing diamond in liquid metal at 1 atm

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We discovered a new method to grow diamonds at the surface of liquid alloy metal (at the interface with the container of the liquid metal—a graphite heating element with a cavity machined into it). A metal mixture is placed inside this graphite crucible that is resistively heated (Joule heating) until it is molten. Diamond particles are found embedded in the surface of the solidified metal piece (what had been the liquid metal) after cooling to room temperature. The temperature range at which diamonds grow seems to be relatively narrow. ^{13}C-labeled methane proved that methane contributes carbon for the growth of these diamonds. A variety of analysis methods prove growth of diamond by this new method (Raman, XRD, TEM, others). Si-vacancy (Si-V) centers were found in the as-grown diamonds (strong photoluminescence peak at ~740 nm), which may find uses in a variety of applications including quantum computing. *Support from the Institute for Basic Science (IBS-R019-D1) is appreciated.*